Chuitna Coal Project
Summary of Previous Baseline Studies for Wetlands

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1 Introduction

The Chuitna Coal Project is a mining project being developed by PacRim Coal LP. The coal resources and proposed facilities are located north of the Chuit River, approximately 45 miles west of Anchorage, Alaska on the west side of Cook Inlet. In the early 1990s, after a decade of baseline studies, a previous project design was permitted under the Alaska Surface Coal Mining Control and Reclamation Act (ASCMCRA; Alaska Statutes [AS] 27.21) and evaluated under the National Environmental Policy Act (NEPA). That project design was not implemented, and after several years of inactivity a revised project is now proposed. This preliminary baseline report summarizes the existing information on wetlands in the Chuitna region. Wetlands are regulated at the federal level by the United States Army Corps of Engineers (USACE), which has authority over the discharge of dredged or fill material into waters of the U.S. The definition of "waters of the U.S." includes wetlands and other waters such as streams, lakes, ponds, and subtidal and intertidal waters. Wetlands are defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3). This summary of existing information focuses on vegetated waters of the U.S., wetlands.

A permit from USACE is required to place dredged or fill material in waters of the U.S., including wetlands, under Section 404 of the Clean Water Act. The applicant must include a preliminary determination of the USACE's jurisdiction along with its Section 404 permit application.

2 Existing Information

2.1 Data sources

Wetlands were mapped during the initial project permitting phase conducted in the late 1980s using off-site resources. The wetlands information was summarized in the Final Environmental Impact Statement[1] (FEIS) published in February 1990 and in the Section 404 permit application (Appendix C of the FEIS). Maps of wetland types were included in the ASCMRA permit application.[2] The existing data pertinent to wetlands in the current project area are presented in the following documents:

- Diamond Chuitna Project Mine Component Vegetation Baseline Report, prepared by Environmental Research & Technology, Inc; 1985.
- Diamond Chuitna Project Mine Component Soils Baseline Report, prepared by Environmental Research & Technology, Inc.; 1985.
- Diamond Chuitna Mine Permit Application to Conduct Surface Coal Mining, prepared by Diamond Alaska Coal Company; 1985 and revised 1986.
- Diamond Chuitna Project Ladd Barging Area and Haul Road Alternatives, Environmental Setting, prepared by Environmental Research & Technology, Inc; 1986.
- Diamond Chuitna Project North Road Baseline Studies Report, prepared by Environmental Research & Technology, Inc; 1987.

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[1] U.S. Environmental Protection Agency. 1990. Diamond Chuitna Coal Project Final Environmental Impact Statement. Seattle, WA. February.

[2] Diamond Alaska Coal Company. 1985 and revised in 1986. Diamond Chuitna Mine permit application to conduct surface coal mining. Vol. I-XXIII. Anchorage, AK. August.

- Diamond Chuitna Coal Project Final Environmental Impact Statement, prepared by the US Environmental Protection Agency; 1990.
- U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) maps, Tyonek A-3 and A-4; August 1978.
- Natural Resources Conservation Service (NRCS), Yentna Soil Survey; 1998.

2.2 Methods

The U.S. Fish and Wildlife Service created NWI maps that cover the project area by interpretation of high altitude aerial photos using stereopaired photographs and limited ground truthing. Wetland types were classified using vegetation, hydrology, and landscape position in accordance with the Cowardin classification system.[3]

NRCS soil scientists completed the Yentna soil survey,[4] which is available in digital format. They identified soil series in the field and determined soil-landscape-vegetation relationships in the survey area. Soil map units and boundaries were drawn based on vegetation and landforms identified on the aerial photos.

Environmental Research and Technology, Inc. mapped wetlands for the original project components in 1985 – 87 by overlaying vegetation maps onto the soils maps created for the baseline reports. Soils data was collected at profiles spaced along four transects within the mine area. Soil map units were drawn using topographic maps and aerial photos. Wetland boundaries were based on the presence of hydric soils and vegetation that indicates wet conditions. The investigators identified hydric soils as those that are poorly and very poorly drained – Cryaquents, Jacobsen, Killey, and Starichkof taxadjunct series. Wetlands were classified to the subclass level in the Cowardin system[3] using the vegetation mapping.

The wetland mapping for the 1988 permit application covers the mine area, and to a limited extent the north transportation corridor and the Ladd development site. The NWI maps and NRCS Yentna soil survey cover all project components.

2.3 Results

The wetland boundaries from the 1988 permit application and NWI mapping are shown in Figures 1 and 2, respectively, overlaid with the current mine component layout. The figures are included at the end of this report. NWI mapped 20 wetland types within the project component footprints. The NWI codes are listed and described in Table 1 below.

[3] Cowardin, L.M. et al. 1979. Classification of Wetlands and Deepwater Habitation of the United States. U.S. Fish and Wildlife Service. Washington, D.C. December.
[4] Natural Resources Conservation Service. 1998. Soil Survey of Yentna Area, Alaska. Palmer, AK. http://www.ak.nrcs.usda.gov/technical/soils/soilsurveys.html

Table 1. NWI wetland and water types in the project area

NWI Code	System, Subsystem[1]	Class and Subclass	Water Regime
E2FLN[2]	Estuarine, intertidal	Flats	Regularly exposed
L1OWH[3]	Lacustrine, limnetic	Open water (unknown bottom)	Permanently flooded
L2AB4H	Lacustrine, littoral	Floating vascular aquatic bed	Permanently flooded
POWH	Palustrine	Open water	Permanently flooded
PEM5B[4]	Palustrine	Persistent emergent	Saturated
PEM5C	Palustrine	Persistent emergent	Seasonally flooded
PEM5F	Palustrine	Persistent emergent	Semipermanently flooded
PSS1/EM5A	Palustrine	Broad-leaved deciduous shrub and persistent emergent	Temporarily flooded
PSS1/EM5B	Palustrine	Broad-leaved deciduous shrub and persistent emergent	Saturated
PSS1/EM5C	Palustrine	Broad-leaved deciduous shrub and persistent emergent	Seasonally flooded
PSS1/EM5F	Palustrine	Broad-leaved deciduous shrub and persistent emergent	Semipermanently flooded
PSS4/EM5B	Palustrine	Needle-leaved evergreen shrub and persistent emergent	Saturated
PSS1A	Palustrine	Broad-leaved deciduous shrub	Temporarily flooded
PSS1B	Palustrine	Broad-leaved deciduous shrub	Saturated
PSS1C	Palustrine	Broad-leaved deciduous shrub	Seasonally flooded
PSS4/1B	Palustrine	Needle-leaved evergreen and broad-leaved deciduous shrub	Saturated
PFO1/SS1A	Palustrine	Broad-leaved deciduous forest and shrub	Temporarily flooded
PFO4/SS1B	Palustrine	Needle-leaved evergreen forest and broad-leaved deciduous shrub	Saturated
PFO4B	Palustrine	Needle-leaved evergreen forest	Saturated

Notes:
[1] There is no subsystem within the palustrine system.
[2] The class symbol FL, for flats, is no longer used by NWI. The current symbol is US, for unconsolidated shore.
[3] The class symbol OW, for open water (unknown bottom), is no longer used. The symbols US (unconsolidated shore), UB (unconsolidated bottom), RS (rocky shore), and RB (rocky bottom) are now used.
[4] The subclass symbol EM5, for narrow-leaved persistent emergent, has been eliminated. The current applicable subclass is EM1, for persistent emergent.

Table 2 summarizes the wetland types and their acreages within each project component's proposed footprint[5], based on the NWI mapping. The dominant wetland types in the component footprints are broad-leaved deciduous shrub and persistent emergent wetlands, either saturated or semi-permanently flooded. Wetlands and other waters constitute 25% of the total area of the project component footprints.

[5] The footprints for the Ladd Landing Development and mine area are the approximate areas that would be directly disturbed by project development. The footprints for the airstrip and transportation corridors are based on 500-foot wide corridors surrounding the airstrip and road and conveyor centerlines, respectively.

Table 2. Wetland and water acreage by project component

NWI Code[1]	Airstrip	Ladd Landing	Mine Area	North Corridor	South Corridor	Total
E2FLN	-	0.9	-	-	-	0.9
L1OWH	-	26.6	-	6.4	-	33.0
L2AB4H	-	-	-	0.3	-	0.3
POWH	0.1	17.5	44.1	0.5	1.1	63.3
PEM5B	-	0.5	107.1	10.2	7.1	124.9
PEM5C	-	-	-	-	3.8	3.8
PEM5F	-	-	222.0	18.4	18.8	259.2
PSS1/EM5A	-	-	-	20.8	3.3	24.2
PSS1/EM5B	2.9	22.7	501.8	58.0	25.5	610.9
PSS1/EM5C	-	-	120.5	2.3	2.5	125.4
PSS1/EM5F	1.1	173.4	59.8	197.0	101.6	532.9
PSS4/EM5B	-	-	-	0.6	5.8	6.4
PSS1A	-	-	10.1	-	2.4	12.5
PSS1B	-	-	12.2	-	-	12.2
PSS1C	-	-	-	-	2.4	2.4
PSS4/1B	-	-	0.3	-	-	0.3
PFO1/SS1A	-	-	-	3.3	-	3.3
PFO4/SS1B	-	-	-	2.0	-	2.0
PFO4B	-	1.0	-	7.9	3.7	12.6
Total - *wetlands and other waters*	4.2	242.6	1,077.8	327.7	178.1	1,830.4
% of component area	4.9%	30.3%	21.5%	39.5%	25.4%	24.6%
UPLAND	82.0	557.2	3,941.6	502.6	523.3	5,606.7
Total - *by component*	86.2	799.7	5,019.4	830.3	701.5	7,437.1

Notes:
Acreages were calculated using the National Wetlands Inventory mapping.
[1] NWI codes are described in Table 1.
[-] This wetland type does not occur within the project component footprint.

The permit application wetland mapping was also used to summarize wetland extent within the mine area now being proposed. Table 3 lists wetland types and acreages inside the mine area. Broad-leaved deciduous shrub and persistent emergent wetlands (PSS1/EM5) are the major wetland type in the mine area, composing 17% of the total mine area and 66% of the wetland area. The permit application wetland mapping shows that 26% of the mine area is wetland or other waters, while the NWI mapping shows 22% of the mine area is wetland or other waters.

Table 3. Wetland and pond acreage in the mine area

NWI Code[1]	Mine Area	Percent of Total Mine Area
PEM5	130.3	2.6%
PFO4	32.0	0.6%
PFO4/1	144.1	2.9%
PSS1	43.0	0.9%
PSS1/EM5	840.1	16.8%
POWH	84.1	1.7%
Total	1,273.6	25.5%
Upland	3,726.7	74.5%
Total	5,000.3	100.0%

Notes:
Acreages were calculated using the wetlands mapped for the permit application within the current proposed mine area.
[1] NWI codes are described in Table 1.

Table 4 below shows the two dominant vegetation communities associated with each wetland type mapped for the 1988 permit application; it includes only the wetland types within the current mine area. The mapping boundaries for the wetlands and vegetation layers do not coincide and weak associations may be due to inaccuracies from the mapping technique, which involved overlaying mylar sheets and manually tracing boundaries. For example, persistent emergent wetlands (PEM5) are mapped as mixed woodland 32% of the time in the vegetation layer. Only the two most dominant associations are shown for this reason. Complete descriptions of vegetation communities, including soils, known successional relationships, species composition, and vegetation structure are provided in the preliminary baseline report for vegetation.[6]

Table 4. Vegetation communities associated with wetland types in the mine area

NWI Code[1]	Dominant Vegetation Communities	
PFO4	Bluejoint grass-herb (54%)	Spruce-birch woodland (46%)
PFO4/1	Spruce-birch woodland (38%)	Sweetgale-grass fen (33%)
PSS1	Closed alder (35%)	Sweetgale-grass fen (28%)
PSS1/EM5	Sweetgale-grass fen (64%)	Spruce-birch woodland (28%)
PEM5	Sweetgale-grass fen (57%)	Spruce-birch woodland (32%)
POWH	Water (45%)	Sweetgale-grass fen (29%)
Upland	Spruce-birch woodland (70%)	Closed alder (18%)

Notes:
Acreages were calculated using the wetlands and vegetation layers from the permit application within the current mine area.
[1] NWI codes are described in Table 1.

[6] HDR Alaska, Inc. 2006. Chuitna Coal Project Preliminary Baseline Report Vegetation. Prepared for Mine Engineers, Inc. March.

Table 5. Hydric and non-hydric soil series acreage by project component

Soil Series	Percentage of Hydric Soil Inclusions	Airstrip	Ladd Landing	Mine Area	North Corridor	South Corridor	Total
Hydric soil series							
Chichantna peat, 0 to 8 percent slopes	NA	7.8	18.8	449.7	70.0	100.4	646.7
Doroshin peat, 0 to 5 percent slopes	NA	-	-	-	1.5	4.5	6.0
Salamatof peat, 0 to 2 percent slopes	NA	-	-	0.5	76.2	-	76.7
Starichkof peat, 0 to 7 percent slopes	NA	-	142.5	244.7	114.0	70.1	571.2
Tyonek peat, 0 to 2 percent slopes	NA	-	-	-	14.8	15.5	30.2
Killey and Hiline silt loams, 0 to 2 percent slopes	NA	-	-	118.0	23.3	16.6	157.8
Slikok muck, 0 to 5 percent slopes	NA	-	-	19.9	19.0	-	39.0
Total of hydric soil map units		7.8	161.3	832.8	318.8	206.9	1,527.7
Non-hydric soil series with hydric soil inclusions							
Schrock silt loam, 0 to 2 percent slopes	5%	-	-	20.9	-	-	20.9
Kroto-Strandline-Cryorthents complex, 30 to 45 percent slopes	10%	0.2	-	576.5	49.9	20.3	647.0
Lucile silt loam, 0 to 2 percent slopes	10%	-	3.1	-	62.2	8.0	73.2
Strandline-Kroto complex, 20 to 45 percent slopes	10%	-	-	159.0	27.0	10.0	196.0
Nancy-Kashwitna complex, 0 to 2 percent slopes	15%	-	177.7	-	13.2	69.4	260.3
Nancy-Kashwitna complex, 2 to 7 percent slopes	15%	-	349.7	-	94.9	174.1	618.7
Nancy-Kashwitna complex, 7 to 12 percent slopes	15%	-	39.0	-	-	-	39.0
Strandline-Kroto-Chichantna complex, 1 to 20 percent slopes	30%	-	-	2,641.2	-	-	2,641.2
Strandline-Kroto-Slikok complex, 1 to 12 percent slopes	35%	-	-	-	19.3	-	19.3
Strandline-Spenard-Kroto complex, 2 to 30 percent slopes	45%	78.2	-	782.9	240.4	211.3	1,312.8
Total of non-hydric soil map units		78.4	569.5	4,180.4	506.9	493.2	5,828.5
Other map units							
Water	NA	-	62.3	6.1	4.5	1.4	74.3
Bluff	NA	-	6.7	-	-	-	6.7
Total of other map units		0.0	69.0	6.1	4.5	1.4	81.0
Total by project component		86.2	799.7	5,019.4	830.3	701.5	7,437.1

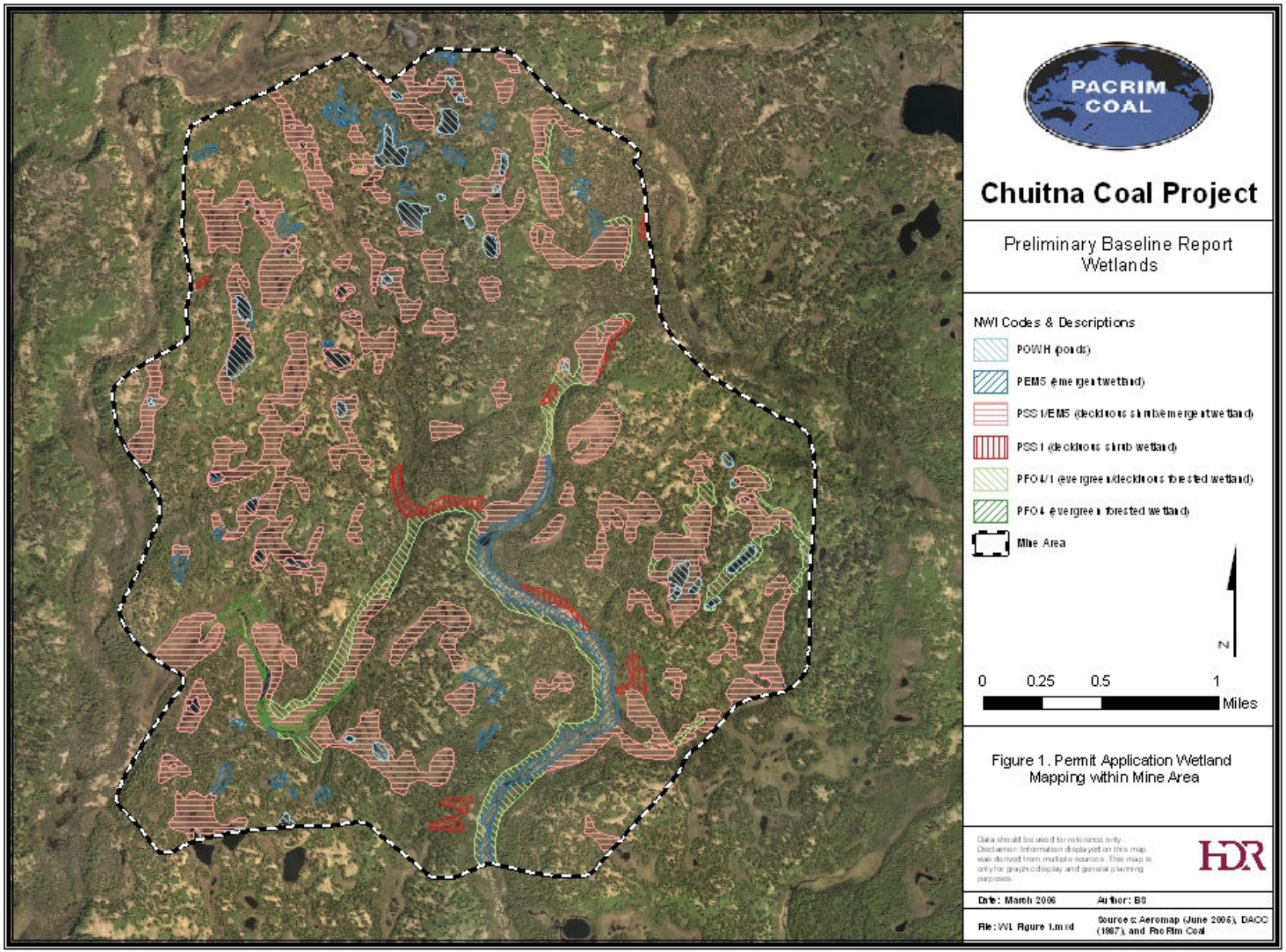
Notes: Acreages were calculated using the NRCS Yentna soil survey.
[NA] not applicable.
[-] this soil series does not occur within the project component footprint.

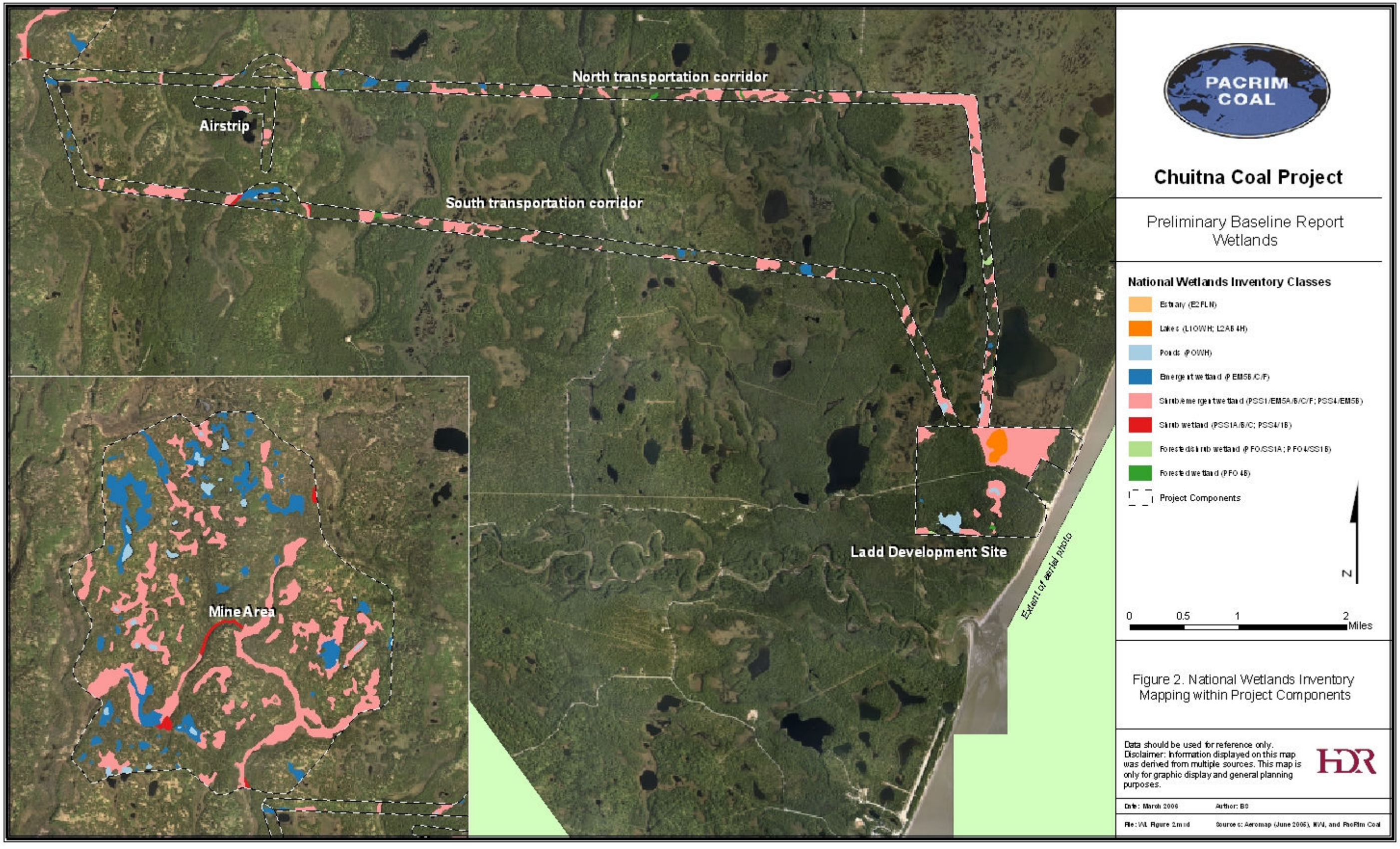
The proposed component footprints were overlaid on the Yentna soil survey to identify hydric soils and soils with hydric inclusions in the project area. The soil survey's mapping of hydric soils provides another prediction of the extent and type of wetlands in the project area. A summary of soil series by project component and their hydric status is provided in Table 5. Hydric soil series in the project area include several peat soils: Chichantna, Doroshin, Salamatof, Starichkof, and Tyonek. Hydric mineral soil series include Killey, Hiline, and Spenard silt loams; and Slikok muck. The Yentna soil survey manuscript includes complete descriptions of the soil series mapped in the project area.

2.4 Wetland functions

The functional values attributed to the wetlands in the project area are summarized in the FEIS.[1] Functions were not based on field verification or associated with wetland types, but instead are discussed generally. Information from the FEIS on the types of functions and values that wetlands in the project area provide is summarized below.

- Food chain production – Wetland plants provide organic matter to the ecosystem through consumption by insects and other invertebrates, moose, bear, and waterfowl; and decomposition of organic matter in the soil profile by bacteria and fungi, which in turn, are eaten by invertebrates. Black spruce cones are a specific wetland food source consumed by squirrels and some birds. The palustrine wetlands in the project area are not considered highly productive and upland vegetation communities may have a higher net primary productivity.
- Habitat for land and aquatic animal species – Wetlands provide openings and habitat diversity important to moose and black bear; pond habitat for waterfowl; and nesting and feeding habitat in the muskegs for sandhill cranes, shorebirds, and songbirds.
- Hydrology and water quality – Hydrology functions performed by wetlands include storing surface water flows, which in turn moderate peak stream flows, and recharging shallow groundwater aquifers. Organic matter in marsh and muskeg wetlands can improve water quality by providing important nutrients to aquatic habitats and also by purifying waters of trace elements and organics through assimilation into the organic mat.
- Recreational use – Recreational value of wetlands in the project area is low due to limited access and the subsistence culture of the region. Moose hunting is an area-wide recreational activity that may occur in the project area.


PACRIM COAL
Chuitna Coal Project
Preliminary Baseline Report
Wetlands
NWI Codes & Descriptions
POWH (ponds)
PEM5 (emergent wetland)
PSS1/EM5 (deciduous shrub/emergent wetland)
PSS1 (deciduous shrub wetland)
PFO4/1 (evergreen/deciduous forested wetland)
PFO4 (evergreen forested wetland)
Mine Area
N
0 0.25 0.5 1
Miles
Figure 1. Permit Application Wetland Mapping within Mine Area
Data should be used for reference only.
Disclaimer: Information displayed on this map was derived from multiple sources. This map is only for graphic display and general planning purposes.
HDR
Date: March 2006
Author: BS
File: WL figure 1.mxd
Source: Aeromap (June 2006), DACC (1987), and PacRim Coal


North transportation corridor
Airstrip
South transportation corridor
Mine Area
Ladd Development Site
Extent of aerial photo
PACRIM COAL
Chuitna Coal Project
Preliminary Baseline Report
Wetlands
National Wetlands Inventory Classes
Estuary (E2FLN)
Lakes (L1OWH; L2AB 4H)
Ponds (POWH)
Emergent wetland (PEM5B/C/F)
Shrub/emergent wetland (PSS1/EM5A/B/C/F; PSS4/EM5B)
Shrub wetland (PSS1A/B/C; PSS4/1B)
Forested/shrub wetland (PFO/SS1A; PFO4/SS1B)
Forested wetland (PFO 4B)
Project Components
N
0
0.5
1
2
Miles
Figure 2. National Wetlands Inventory Mapping within Project Components
Data should be used for reference only.
Disclaimer: Information displayed on this map was derived from multiple sources. This map is only for graphic display and general planning purposes.
HDR
Date: March 2006
Author: BS
File: WL Figure 2.mxd
Sources: Aeromap (June 2005), NWI, and PacRim Coal